

Precision Imaging System Grids



NASA's Marshall Space Flight Center is offering licensing opportunities to use its newest fabrication process for high-precision imaging system grids. The method offers an attractive combination of better technology at much lower costs—it improves imaging precision while substantially reducing fabrication expenses and time. Potential uses for imaging system grids fabricated by this low-cost process are numerous, including medical devices and airport security baggage inspection systems. NASA currently uses the fabrication method to produce grids for its Fourier imaging system.

Benefits

- High-precision spacing (tens of microns) and high degree of parallelism
- Grid slits much smaller than 1mm are possible
- Low cost could reduce grid fabrication expenses by a factor of 100
- Greatly reduces grid fabrication times
- Wide range of materials can be used to construct grids
- Adaptability allows use in multiple application configurations



Commercial Applications

Precision grids can be used in a wide range of imaging system applications including:

- Airport security X-ray imaging for high-volume baggage inspection
- Medical X-ray and gamma ray imaging, including radiography, mammography and nuclear medicine
- Industrial imaging, including product defect analysis
- Imaging of solar flares or distant star activity
- Analytical imaging instruments, including spectrometers and diffractometers
- Radioactive waste assessment
- Neutron imaging applications including neutron interferometry

The Technology

NASA's high-precision, low-cost imaging system grid fabrication process allows manufacturers to reduce costs while achieving the superior imaging system accuracy and performance needed in most applications. These grids are being used by NASA in Fourier imaging systems to image X-rays, gamma rays, and neutrons.

The grids essentially consist of alternating precision tapes of high atomic weight material (e.g. tungsten) and low atomic weight material (e.g. glass or aluminum), to the desired thickness using a detection system. Variable compression can be used to achieve high precision alignment of the slits and slats or to match one grid to another.

Precise knowledge of the grid's makeup is straightforward to map and tolerance error buildup can be easily avoided during fabrication. Random tolerance errors can be simply mapped and then subtracted out of the data for that grid.

Grid fabrication features include:

- Grid thickness can range from 2 mm to 20 mm
- Grid sizes up to 10 cm can be produced
- Precise grid pitch
- For high resolution, slit and slat width could be as low as 10 microns
- Any configuration of grid design may be built using this approach
- Tapes or ribbons made to acceptable tolerances can be obtained at fairly low costs
- Can check alignment of tapes with computer tracking of tape thickness distributions
- Can track and correct tolerance errors

NASA offers licensing opportunities on this technology as part of its technology commercialization program, which seeks to stimulate commercial use of NASA-developed technologies. NASA has filed for patent protection on the fabrication method.

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